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Comparing the last product on the right with

$$\prod_{m+1}^{n}\left(1-\frac{z^2}{m^2c^2}\right),$$

we see that it is as near unity as we please while the first product is as close to

$$\prod_{-m}^{m}\left(1-\frac{z}{(m+\frac{1}{2})c}\right)$$

as we please if n is large enough.

Thus we see that

$$\operatorname*{Lim}_{n=\infty} f_n'(z) = F'(z) = \operatorname*{Lim}_{n=\infty}\prod_{-n}^{n}\left(1-\frac{z}{(m+\frac{1}{2})c}\right).$$

By the same reasoning we show that

$$F''(z) = -\frac{8}{c^2}\sum_{1}^{\infty}\frac{1}{(2n+1)^2}F(z), \tag{3}$$

and integrating the differential equation (3) we have

$$F(z) = \sin\frac{\sqrt{8\Sigma}}{c}z = kz\prod_{1}^{\infty}\left(1-\frac{z^2}{n^2c^2}\right).$$

The constant k is seen to be $\sqrt{8\Sigma}/c$ and $\sqrt{8\Sigma}$ can be evaluated by noting that since sine x has the period 2π and the product the period $2c$ we have

$$\sqrt{8\Sigma} = \pi.$$

The product for $\cos \pi z/c$ can be gotten in the same way, since

$$F'(z) = \cos\frac{\sqrt{8\Sigma}}{c}z$$

is the solution of (3) required.

NOTES AND NEWS.

EDITED BY D. A. ROTHROCK, Indiana University, Bloomington, Indiana.

Assistant Professor C. B. UPTON has been promoted to an associate professorship of mathematics at Teachers College, Columbia University.

Mr. W. H. WILSON, University of Illinois, has accepted an instructorship in mathematics at the Massachusetts Institute of Technology.

Professor A. M. HARDING has been promoted to a full professorship of mathematics at the University of Arkansas.

Dr. G. R. CLEMENTS, of the University of Wisconsin, has been appointed instructor in mathematics at the U. S. Naval Academy, Annapolis.

Professor E. H. MOORE, University of Chicago, has been appointed chairman of the Mathematical Committee of the National Research Council.

Word has been received announcing the death of Mr. J. A. COLSON, at Searsport, Me., February 13, 1917. Mr. COLSON was a charter member of the Association.

Dr. J. W. NICHOLSON, for forty years professor of mathematics in the University of Louisiana, and author of school and college text-books, died on March 22. Dr. NICHOLSON was a charter member of the Association.

Professor WILLIAM BEEBE, of the mathematical faculty of Yale University, died on March 11, aged sixty-six. He graduated from Yale in 1873, and had been teaching in that institution since 1876.

The fourth meeting of the Kansas Section was held at the University of Kansas on Saturday, March 17, 1917. An important program was carried out, a full report of which will appear in the June issue of the MONTHLY.

The Benjamin Peirce instructorships in mathematics at Harvard University have been filled by the reappointment of Dr. W. L. HART and the appointment of Dr. T. A. PIERCE. Mr. B. H. BROWN and Mr. J. L. WALSH have been appointed instructors in mathematics; and Dr. L. R. FORD, of the University of Edinburgh, has been appointed instructor in actuarial mathematics.

At the meeting of the Royal Society, February 22, one mathematical paper was presented, entitled "The ordinary convergence of restricted Fourier series," by Professor W. H. YOUNG.

Three papers of interest to teachers of mathematics appear in the March issue of *School Science and Mathematics* as follows: "Recent tendency in the teaching of elementary applied mathematics," by J. R. YOUNG; "Algebraic derivation of the law of cosines," by A. BABBITT; "A method of demonstrating and teaching the trigonometric functions," by S. C. MITCHELL.

On December 27–29, 1916, the Indian Mathematical Society held its first conference at Madras. An account of this meeting, the secretary's report and the presidential address are contained in the first number of Vol. IX of the *Journal of the Indian Mathematical Society.*

Professor A. GÉRARDIN, writing from Paris under date of February 24, 1917, reports the death of his two collaborators, Professors Barisien and Rudis, and the serious illness of Professor M. H. Brocard.

The MONTHLY still has on hand some copies of the reprints of Professor Huntington's paper on the "Logical skeleton of elementary dynamics," which may be had from the Secretary of the Association, Professor W. D. Cairns, 55 East Lorain St., Oberlin, Ohio, at ten cents each, postage prepaid.

The 191st regular meeting of the American Mathematical Society was held in New York on April 28, 1917. There were fourteen papers on the printed program, including one by Professor MAURICE FRÉCHET, of the University of Poitiers, and one by Professor LUIGI BIANCHI, of the University of Pisa.

Professor H. N. RUSSELL, Princeton University, has been appointed chairman of Section A (Mathematics and Astronomy) for the Pittsburgh meeting of the American Association for the Advancement of Science, to be held December 28, 1917, to January 2, 1918. Professor G. A. MILLER, University of Illinois, was elected from the Association at Large to represent Section A upon the Council for the same meeting.

Professor W. GILLESPIE, of the department of mathematics, at Princeton University, has gone with a party of students to the war zone for work under the direction of the Y. M. C. A. for the benefit of the English soldiers.

Professor R. C. ARCHIBALD, Brown University, writes that he would be glad to learn from any of the readers of the MONTHLY if a copy of a Russian translation of Steiner's little book, *Die geometrischen Konstructionen ausgeführt mittelst der geraden Linie und eines festen Kreises,* can be found in America. The book was translated into Russian by P. EROCHIN and R. HOLZBERG, and was edited by D. SINTZOR.

UNIVERSITY OF NEBRASKA. Summer session, June 11 to August 3. By Professor W. C. BRENKE: Calculus, five hours; Teachers' course, three hours; College algebra and plane trigonometry, five hours each.

UNIVERSITY OF ILLINOIS. The following mathematical courses are announced for the summer session of 1917: By Professor G. A. MILLER: Introduction to group theory; Theory of equations and determinants.—By Professor ARNOLD EMCH: Projective geometry; Constructive geometry.—By Dr. G. E. WAHLIN: Advanced calculus; Integral calculus.—Dr. E. W. CHITTENDEN: Differential calculus.—By Mr. H. D. FRARY: Analytical geometry.—By Mr. R. F. BORDEN: Plane trigonometry.—By Mr. C. H. RICHARDSON: College algebra.

UNIVERSITY OF WISCONSIN. Summer Session, June 25 to August 3.—By Professor C. S. SLICHTER: Mechanics, five hours; Hydrostatics, three hours; Algebra, five hours.—By Professor L. W. DOWLING: Theory of functions, three hours; Higher geometry, five hours; Analytic geometry, five hours.—By Assistant Professor ARNOLD DRESDEN: Calculus of variations, three hours; Definite integrals, five hours; Calculus, five hours.—By Dr. T. M. SIMPSON: Differential equations, five hours; Commercial Algebra, five hours; Trigonometry, five hours. —By Assistant Professor W. W. HART: Determinants, three hours; Solid geometry, five hours; Teachers' course, five hours.

At the regular meeting of the London Mathematical Society held on February 1, the following papers were read: "The significance of a certain algebraic fraction in the theory of distributions" and "The number of ways of pairing off the members of two identical sets of different quantities," by Major MCMAHON; and "Curves of constant torsion," by W. H. SALMON. At the meeting held on March 1, papers were presented by A. E. JOLLIFFE on "Some properties of the quadrangle formed by the points of contact of the tangents to a nodal cubic," and by E. H. NEVILLE, on "Indicatrices of curvature."

The January, 1917, number of *The Rice Institute Pamphlet* has appeared containing the lectures delivered at the inauguration of Rice Institute by Professor EMIL BOREL, director of scientific studies at the Ecole Normale and professor of mathematics at the University of Paris, and by Senator VITO VOLTERRA, professor of mathematical physics and celestial mechanics at the University of Rome. Professor BOREL delivered lectures upon (1) "Aggregates of zero measure," and (2) "Monogenic uniform non-analytic functions"; Professor VOLTERRA's lectures were: (1) "The generalization of analytic functions" and (2) "On the theory of waves and Green's method."

It is remarkable that the French mathematicians can continue to issue a number of their periodicals. The May and June, 1916, numbers of the *Annales Scientifiques de L'École Normale Supérieure* have recently reached this country, containing lengthy memoirs. The January and February numbers of the *Bulletin des Sciences Mathématiques* are also at hand. Besides the reports and reviews these numbers of the *Bulletin* contain the following short papers: "Upon a theorem of Bertrand," by P. APPELL; and "A direct demonstration of the last theorem of Poincaré," by T. DANTZIG, of Indiana University.

The recently formed Mathematical Club at the University of North Carolina reports an enthusiastic membership numbering thirty. The plan of the programs is to meet once a month, having two papers presented, one upon a mathematical subject, and one upon some allied subject. The following subjects have been presented: "Mathematical requirements for electrical engineering students," "The differential coefficient," "The logic of mathematics," "Inscription of a 17-gon in a circle," "The teaching of mathematics in the high school" and "A note on linear equations."

In *Nature,* March 8, Professor JOSEPH LARMOR gives a short account of the life of the renowned French geometer, Professor GASTON DARBOUX, who died in Paris in February. DARBOUX was born at Nîmes, August 13, 1842; he received his early training at the lycée of his native town, being engaged at the school from 6 A. M. to 8 P. M. Later he studied in the lycée at Montpelier, and in 1861 passed the examinations at the head of his class for admission to the Ecole Polytechnique and the Ecole Normale. Intending to engage in teaching, he chose the latter institution and began his studies with great inclination to the study of geometry, mastering the classic works of Monge, Gauss, Poncelet, Dupin, Lamé and Jacobi. In 1864 his memoir on orthogonal surfaces appeared in the *Comptes Rendus,* and two years later this same subject served as his dissertation for the doctorate in mathematical sciences at the Sorbonne. DARBOUX then began his career as a teacher of mathematics, first at the Collège de France, then at the Lycée Louis de Grande, and later as an assistant to Liouville at the Sorbonne. In 1880 he began his life work as professor of higher geometry at the Sorbonne, a position especially created for the renowned geometer Chasles, in 1846. During fourteen years following his graduation from the Sorbonne, DARBOUX published many original memoirs on partial differential equations, and theory of surfaces. In later years this early work was elaborated and published, 1887–1896, in the four classical volumes on infinitesimal geometry known as General Theory of Surfaces. DARBOUX was highly honored by being made a member of the Paris Academy of Sciences, 1884, and since 1900 its perpetual secretary. He was elected a foreign member of the Royal Society, 1900, and in 1916 received its high tribute by being awarded the Sylvester Medal.

The eighth regular meeting of the American Mathematical Society at Chicago was held on Friday and Saturday, April 6–7, 1917. In addition to sixteen papers on the program, there was held on Friday afternoon a symposium on "The Lebesgue Integral," conducted by Professor G. A. BLISS, of the University of Chicago, and Professor T. H. HILDEBRANDT, of the University of Michigan. Detailed synopses of these papers were printed with full references to the literature, and distributed in advance of the meeting. This symposium proved to be a most interesting and edifying part of the program. The dinner on Friday evening was, as usual, accompanied with informal talks on topics of interest to the mathematical fraternity, including particularly the new relation of the *Annals of Mathematics* to the Mathematical Association of America, and the contribution which the mathematicians of the United States might make to the government in the present war crisis. As the outcome of the discussion on the latter point, it was voted that the officers of the Society and of the Association present be requested to make recommendations to their respective Councils in the matter of organizing the resources of the mathematical constituency of the United States in the service of the government. Accordingly, the officers above mentioned joined in recommending that the Councils of the two organizations empower their officers to carry forward this program, in particular, to make a census of the members, if the government advises this, in order to list the various activities in which members are able, experienced, and willing to aid the government. The Council of the Association has since authorized such action as the officers deem wise by a practically unanimous vote.

At the Massachusetts Institute of Technology, a committee of the faculty has been appointed to consider ways of improving methods of instruction. Dr. C. R. Mann, who for the past two years has been preparing a report on engineering education under the auspices of the Carnegie Foundation for the Advancement of Teaching, has been called to the Institute to be chairman of the committee. In the *Educational Review*, January 17, Dr. Mann has published "A study of engineering education," reprinted from a Bulletin of the Society for the Promotion of Engineering Education. This is a very interesting report, tracing briefly the progress of education during colonial times, showing the increase of the demand for technical education, and the founding of the Rensselaer Polytechnic Institute in 1824, the first engineering school in the United States. The report then refers to the great industrial development of the period from 1825 to 1860, the Morrill Act of 1862 and the founding of the state colleges of mechanic arts in the years 1862–1875.

The report also shows some interesting studies on the capabilities of students in technical schools. Under the head of "What freshmen know and can do," it is shown that 90 per cent. of those tested could solve the simplest linear equation in algebra, while only one third of the freshmen could substitute and correctly reduce a simple, fractional expression containing x, a, b, when $x = (a + b) \div 2$. But in "What the schools do to freshmen," it appears that of 2,000 students who entered technical schools in 1911, only 732 graduated in 1915; the mortality in particular studies seems rather high, 52 per cent. passing in physics and a like number in mechanics, 45 per cent. in calculus, 43 per cent. in modern languages and English, and 34 per cent. in chemistry.

The large number of failures in the cases studied would amply justify the maintenance of such a committee as Dr. Mann is to head at the Massachusetts Institute of Technology to consider ways of improving methods of instruction. No doubt other institutions of higher education would profit in the effectiveness of their service to the people should similar investigations be instituted. Too often do instructors assume the attitude of examiner rather than that of real service to the students. The student has not learned how to work, and hence needs help. When 50 per cent., or 40 per cent., or 25 per cent., of a class in mathematics fail, the instructor should first be quite sure that the fault is wholly with the students.

Much interest is being manifested among colleges and universities in the maintenance of mathematical clubs for the especial benefit of undergraduate students. A large number of printed programs of these clubs has been received by the Monthly, and many inquiries have been made relative to material for such programs. The programs received by the editors are fashioned along similar lines, and include a range of subjects which should create much interest in the common knowledge of mathematics.

We append a collection of subjects suitable for club programs. (*A*) *Geom-*

etry: (1) Three historic problems; (2) "Flatland"; (3) Non-Euclidean geometry; (4) The fourth dimension; (5) The straight line; (6) Curve tracing; (7) The probability curve; (8) Imaginary loci; (9) Optical images; (10) The nine point circle; (11) Circles connected with a triangle; (12) Expressions for the area of a triangle; (13) Proofs of the Pythagorean theorem; (14) The planimeter; (15) Ancient geometry; (16) Modern geometry. (*B*) *Arithmetic and Algebra:* (17) Mathematical games; (18) The slide rule; (19) Magic squares; (20) Development of arithmetic and algebra; (21) Calculation of π and e; (22) Adding and multiplying machines; (23) Mathematical symbolism; (24) Numerical properties of color and sound; (25) Logarithms; (26) Mathematics of insurance and statistics; (27) Fermat's last theorem; (28) Theory of errors; (29) Mathematics of the calendar; (30) Properties of the numbers 9 and 37; (31) Number systems; (32) Remarkable numbers. (*C*) *Historical and Pedagogical:* (33) Mathematics of the Hindus; (34) Egyptian and Greek mathematics; (35) Mathematics of the Renaissance; (36) Japanese mathematics; (37) The development of trigonometry; (38) The German and French secondary schools; (39) Mathematics in the German universities; (40) Mathematics in American universities; (41) Vocational mathematics; (42) The development of the calculus; (43) Lives of great mathematicians (many subjects available); (44) Controversy between Leibnitz and Newton; (45) Definitions in mathematics; (46) "A Budget of Paradoxes," De Morgan; (47) Mathematical periodicals; (48) Zeno's arguments; (49) Opportunities for the study of graduate mathematics; (50) Why study mathematics?

Another series of topics is in preparation for publication and this is to contain references to the literature which may be helpful to clubs making use of the topics.

NOTES ON THE ASSOCIATION.

The membership of the Association grows with interesting speed. Since the Charter Membership list was completed on April 1, 1916, there have been added in September, 1916, 13 individual members and 8 institutional members; in December, 1916, 15 individual members and 16 institutional members; in February, 1917, 13 individual members and one institutional member; in April, 1917, 22 individual members and one institutional member. Thus the total additions to the Charter list are 63 individual and 26 institutional members. The names, hitherto unpublished, which were voted on by the Council in April, are as follows:

Kansas State Agricultural College to institutional membership.
Samuel Beatty, Lecturer, University of Toronto, Toronto, Can.
Sister Brigetta, Instructor in mathematics, College of St. Scholastica, Duluth, Minn.
H. N. Carleton, West Newbury, Mass.
Chancellor A. B. Chace, Brown University, Providence, R. I.
H. T. Davis, Instructor in mathematics, High School, Colorado Springs, Colo.